

**MOBILE STORAGE DEVICE WITH WIRELESS BLUETOOTH**

**MODULE ATTACHED THERETO**

**Field of the invention**

The present invention relates to a mobile storage device with a wireless

5      Bluetooth module attached thereto and, more particularly, to a small mobile storage device like a mobile disk, an MP3 walkman or a small digital voice recorder (DVR) with a wireless Bluetooth module attached thereto so that it can accomplish wireless transmission of data or voice with a mobile phone or a computer equipment.

**10      Background of the invention**

Along with progress of the memory technology, many electronic products have become increasingly compact but can still store several megabytes of data. If expansion memory cards are added, the storage capacity can even be endlessly expanded. Moreover, with multifunctional processing chips,

15      electronic products have more and more functions. For instance, existent mobile disks use flash memories for storing considerable quantities of digital data and use USB interface for connection with computers.

If an MP3 processing chip is attached to a mobile disk, pop songs can be stored in the flash memory in the format of MP3 files. Through playback of the

20      MP3 processing chip, the mobile disk becomes an MP3 walkman. If a microphone is further combined with the MP3 processing chip, the mobile disk becomes a small digital voice recorder capable of recording voices anytime, anywhere. Because the multifunctional mobile disk is small, it can be attached to another electronic product like a digital still camera, and can then make use

of the memory card of the digital still camera to expand its storage capacity. Therefore, the digital still camera has all the functions of digital still camera, mobile disk, MP3 walkman, and digital voice recorder. Furthermore, the mobile disk can be attached to a mobile phone or a personal digital assistant 5 (PDA) to expand the functions thereof further.

However, whatever the above multifunctional mobile storage device is connected to, a computer, a mobile phone, a digital still camera or a PDA, a transmission line like a USB transmission line is required. Moreover, the MP3 walkman also needs an earphone line connected the MP3 mobile disk for 10 listening to music. Along with quick development of wireless transmission techniques, the above wired transmission methods can be replaced with a wireless transmission method like the Bluetooth technology for transmission of data and voice signals.

Nowadays, the Bluetooth technology is becoming increasingly popular. 15 Many Bluetooth earphones are on the market, and they are usually accompany mobile phones for hands-free use. This kind of Bluetooth earphone has only a single function and can't be used for other applications. Accordingly, the present invention aims to integrate a wireless Bluetooth module in the above multifunctional mobile disk to replace the original wired transmission method 20 with a wireless transmission way for transmission of digital data and voice signals to a Bluetooth earphone.

### **Summary of the invention**

An object of the present invention is to integrate a wireless Bluetooth module like a Bluetooth earphone into a multifunctional mobile storage device

like a small mobile disk, an MP3 walkman or a small digital voice recorder to accomplish wireless connection with a remote device like a Bluetooth computer, a Bluetooth PDA or a Bluetooth MP3 walkman for wireless transmission of digital data, MP3 digital files or voice signals, thereby enhancing the wireless 5 transmission function of the multifunction mobile storage device.

To achieve the above object, the present invention provides a mobile storage device with a wireless Bluetooth module attached thereto, which comprises a memory control module connected with at least a memory for storage of digital data, an MP3 processing module connected to the memory control module and used to encode/decode a voice signal and an MP3 digital file, a Bluetooth earphone module movably inserted into the storage device and connected to the memory control module and the MP3 processing module and capable of accomplishing wireless transmission of digital data or voice signals with a remote device using the same frequency and channel, and an electronic control 10 switch connected to the MP3 processing module and the Bluetooth earphone module and also connected with at least an earphone and a microphone. Digital data or voice I/O signals transmitted by the Bluetooth earphone module or the MP3 processing module can be switched by the electronic control switch to achieve wireless transmission function of the mobile storage device.

15 Another object of the present invention is to provide the above mobile storage device with a wireless Bluetooth module attached thereto, in which the MP3 processing module can be used as an MP3 walkman or a recording device.

20 Yet another object of the present invention is to provide the above mobile storage device with a wireless Bluetooth module attached thereto. The remote

device is also a Bluetooth module, which can be connected to a computer device, a mobile phone, a Bluetooth earphone, a PDA, or another mobile storage device to accomplish sharing and transmission of data stored in the memory.

- 5 Still another object of the present invention is to provide the above mobile storage device with a wireless Bluetooth module attached thereto, where when the remote device is connected to a mobile phone and the mobile phone has an incoming call, the electronic control switch can be controlled to switch the earphone and the microphone to be connected to the Bluetooth earphone module for accomplishing the effect of automatically answering the incoming call.
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#### **Brief description of the drawings**

- The various objects and advantages of the present invention will be more readily understood from the following detailed description when read in conjunction with the appended drawing, in which:
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Fig. 1 is a perspective view and a wireless connection architecture diagram of the present invention;

Fig. 2 is a circuit block diagram of the present invention;

- 20 Fig. 3 is an application diagram showing wireless connection between the present invention and a mobile phone; and

Fig. 4 is an application diagram showing sharing of MP3 files of the present invention.

#### **Detailed description of the preferred embodiments**

As shown in Fig. 1, the present invention provides a mobile storage device 1

with a wireless Bluetooth earphone module 10 attached thereto. The mobile storage device 1 can be a multifunctional flash memory disk having the functions of storage of digital data, an MP3 walkman or a recording device. The Bluetooth earphone module 10 can be for wireless transmission with at least a remote device. The remote device has also a wireless Bluetooth module (a remote device having a wireless Bluetooth module will be briefly termed as a remote Bluetooth module below), and can transmit digital or voice data using the same frequency and channel. The remote Bluetooth module can be a computer equipment 100, a mobile phone 101, a PDA 102, a Bluetooth earphone/microphone 103, or another mobile storage device.

The mobile storage device 1 of the present invention has an outer shell 11 with a display 12 and a plurality of function operation keys 13 arranged thereon. The display 12 can display the information (e.g., the directory and name) of the MP3 file being played. The function operation keys 13 can be used to select the function of the mobile storage device 1, such as, for example, MP3 playback function, voice recording function, memory function or transmission function, and can also be used to select the MP3 file to be played. The operation keys 13 can comprise a playback key, a stop key, a recording key and a volume key.

The outer shell 11 has an opening at the upper end thereof, and forms an accommodating groove. The Bluetooth earphone module 10 can be inserted into or detached from the accommodating groove. When the Bluetooth earphone module 10 is inserted into the accommodating groove, it can be connected with internal circuits of the mobile storage device to become a Bluetooth module of the mobile storage device 1 for accomplishing wireless

transmission with a remote Bluetooth module. When the Bluetooth earphone module 10 is detached from the accommodating groove, it can be used as a common Bluetooth earphone. Besides, an earphone/microphone connection port 14 can be provided on the outer shell 11 for connection with an earphone 5 15 and a microphone 16. The microphone 16 is preferably installed inside the outer shell 11.

As shown in Fig. 2, the mobile storage device 1 of the present invention at least comprises a memory control module 21, an MP3 processing module 22, a Bluetooth earphone module 23 and an electronic control switch 24. The 10 electronic control switch 24 is electrically connected to the earphone 15 and the microphone 16. The memory control module 21 is electrically connected with at least a memory 211 capable of storing considerable quantities of digital data. The memory 211 can be a flash memory. It is also feasible that the memory control module 211 is a memory card reader and the memory card 211 is a 15 memory card movably inserted into the memory card reader for expansion or replacement of the memory card.

The MP3 processing module 22 is electrically connected to the memory control module 21, and has at least a first output signal line SO1 and a first input signal line SI1 both connected to the electronic control switch 24. The 20 MP3 processing module 12 can be an MP3 decoding chip capable of decoding an MP3 digital file in the memory 211 into a voice signal outputted to the first output signal line SO1 and then to the earphone 15 through control of the electronic control switch 24. The electronic control switch 24 can also control the voice signal to be outputted to the Bluetooth earphone module 23 for

wireless transmission to a remote Bluetooth module 200 like the Bluetooth earphone/microphone 103, thereby forming an MP3 playback device.

The MP3 processing module 22 is further electrically connected with the display 12 and the function operation keys 13. The display 12 can be used to 5 display the information of an MP3 digital file to be displayed. The function operation keys 13 include the playback key, the stop key and the volume key, and can be used to control playback or stop of the MP3 digital file, or select the MP3 digital file to be played by the MP3 processing module 22, or control the volume.

10 The MP3 processing module 22 can also be an MP3 encoding chip capable of encoding the voice signal inputted from the microphone 16 via the first input signal line SI1 into the MP3 digital file stored into the memory 211 through control of the electronic control switch 24, thereby forming a voice recording device. Similarly, the electronic control switch 24 can control the Bluetooth 15 earphone module 23 to send the voice signal of the remote Bluetooth module 200 like the Bluetooth earphone/microphone 103 to the MP3 processing module 22. The function operation keys 13 can further comprise the recording key for controlling the MP3 processing module 22 to record voice.

The Bluetooth earphone module 23 can be movably inserted into or detached 20 from the memory control module 21 and the MP3 processing module 22. The Bluetooth earphone module 23 can accomplish wireless transmission of the digital data, the MP3 digital file or the voice signal with at least a remote Bluetooth module 200 using the same frequency and channel. The Bluetooth earphone module 23 has at least a second output signal line SO2 and a second

input signal line SI2 both connected to the electronic control switch 24.

When the remote Bluetooth module 200 is the computer equipment 100, because the Bluetooth earphone module 23 is connected to the memory control module 21, the memory control module can accomplish wireless connection 5 with the computer equipment 100 for direct transmission of digital data. This is an application of flash memory disk. The transmitted digital data can be an MP3 digital file directly stored in the memory 211 for expansion or replacement of the MP3 digital file.

As shown in Fig. 3, when the remote Bluetooth module 200 is a mobile 10 phone 101, the Bluetooth earphone module 23 can accomplish wireless connection with the mobile phone 101. The electronic control switch 24 can switch the second output signal line SO2 and the second input signal line SI2 to electrically connect the earphone/microphone 103 for answering the mobile phone 101.

If the present invention is used for the function of an MP3 walkman, the 15 electronic control switch 24 will switch the first output signal line SO1 to electrically connect the earphone 15 so that one can listen to the MP3 digital file. When the mobile phone 101 has an incoming call, The electronic controls switch 24 can automatically switch the second output signal line SO2 and the 20 second input signal line SI2 to electrically connect the earphone 15 and the microphone 16 for automatically answering the incoming call, respectively.

As shown in Fig. 4, when the present invention is used for the function of an MP3 walkman and the remote Bluetooth module 200 includes a plurality of Bluetooth earphones/microphones 103, all the Bluetooth earphone module 23

and the plurality of Bluetooth earphones/microphones 103 can use the same frequency and channel so that all the Bluetooth earphones/microphones 103 can be used for listening to the MP3 digital file being played. This application is preferably applied in a multi-user language learning situation. If the remote  
5      Bluetooth module 200 is another mobile storage device, sharing of MP3 digital files can be accomplished through wireless transmission. Of course, the Bluetooth earphone module 23 can switch different channels to avoid mutual interference.

To sum up, the electronic control switch 24 of the present invention can  
10     make use of function control of the function operation keys 13 to switch the Bluetooth earphone module 23 and the remote Bluetooth module 23 for wireless transmission of digital data, or switch the first output signal line SO1 or the second output signal line SO2 to electrically connect the earphone 15, or switch the first input signal line SI1 or the second input signal line SI2 to  
15     electrically connect the microphone 15

Although the present invention has been described with reference to the preferred embodiment thereof, it will be understood that the invention is not limited to the details thereof. Various substitutions and modifications have been suggested in the foregoing description, and other will occur to those of ordinary skill in the art. Therefore, all such substitutions and modifications are intended  
20     to be embraced within the scope of the invention as defined in the appended claims.